

Math 10B Take home quiz 8

Key

To this without the help or input of tutors, classmates, etc.

You may use your notes + book. Show all work, neatly!!

Answers given without work shown will receive no credit.

1. Simplify the rational expressions

$$a. \frac{-48x^2y^6}{60x^3y^2} = \frac{-4y^4}{5x}$$

$$b. \frac{6t^2 - 4t}{5t^3 + 7t^2 + 2t} = \frac{2t(3t - 2)}{t(5t^2 + 7t + 2)} = \frac{2(3t - 2)}{(5t + 2)(t + 1)}$$

$$c. \frac{9 - x^2}{x - 3} = \frac{(3 - x)(3 + x)}{(x - 3)} = \frac{-1(3 + x)}{-(x - 3)} \text{ or } \frac{-(x + 3)}{-(x - 3)}$$

2.a. Find the Lcd of $\frac{c}{2c^2(c+1)}$, $\frac{c+1}{3c}$, and $\frac{5}{(c+1)^2}$

$$2 \cdot 3 \cdot c^2(c+1)^2 = 6c^2(c+1)^2$$

$$b. \text{Compute } \frac{4}{b-3} - \frac{1}{3-b} + \frac{2}{b^2-9} = \frac{?}{(b^2-9) \rightarrow \text{LCD}}$$

$$\frac{4}{b-3}, \frac{b+3}{b+3} - \frac{1}{3-b}, \frac{3+b}{3+b}, \frac{-1}{-1} + \frac{2}{b^2-9} = \frac{5b+17}{b^2-9}$$

$$4b + 12 + 3 + b + 2$$

3. Multiply $\frac{6x(5-x)}{15} \cdot \frac{9(x+5)}{x^2(x^2-25)}$

$$= \frac{2x(5-x)}{15} \cdot \frac{9(x+5)}{x^2(x-5)(x+5)} = \frac{(-2)(9)}{5x} = \boxed{\frac{-18}{5x}}$$

4. Divide $\frac{-x^2 + 4x - 3}{x^2 - 5x + 6} \div \frac{5x^2 - 5x}{2x^2 - 7x + 6}$

$$= \frac{-(x^2 - 4x + 3)}{(x-3)(x-2)} \cdot \frac{(2x-3)(x-2)}{5x(x-1)}$$

$$= \frac{-(x-3)(x+1)}{(x-3)(x-2)} \cdot \frac{(2x-3)(x-2)}{5x(x-1)} = \boxed{\frac{-(2x-3)}{5x}}$$

5. Solve $\frac{-x+7}{x-1} - \frac{1}{4} = \frac{2x-1}{4x-4}$ Multiply through by
the LCD $4(x-1)$
to clear denominators

$$\frac{4(x-1)(-x+7)}{(x-1)} - \frac{1 \cdot 4(x-1)}{1} = \frac{2x-1}{4(x-1)} \cdot 4(x-1) \rightarrow -4x + 28 - 4x + 4 = 2x - 1 \rightarrow -10x = -33 \rightarrow \boxed{x = \frac{33}{10}}$$

6.a. Solve $10\left(\frac{x-2}{5}\right) \leq \left(\frac{x-3}{2}\right)10$

$$2(x-2) \leq 5x - 30 \rightarrow 2x - 4 \leq 5x - 30 \rightarrow -3x \leq -26 \rightarrow x \geq \frac{26}{3}$$

b. Solve $|x+3| > 7$

$$x+3 > 7 \quad \text{or} \quad x+3 < -7$$

$$\boxed{x > 4}$$

$$\text{or} \quad \boxed{x < -10}$$

6a) $\frac{x-2}{5} \leq \frac{3x+3}{2}$ LCD = 10

$$2(x-2) \leq 5(3x+3)$$

$$2x-4 \leq 15x+15$$

$$2x-4 \leq 15x-30$$

$$\frac{26}{3} \leq 13x \rightarrow x \geq \frac{26}{39}$$

6b) $|x+3| > 7$

Talk about the 3 models:

$|x| = a$ means $x = a$ or $x = -a$

$|x| \leq a$ (means $-a \leq x \leq a$)

$|x| > a$ means $x > a$ or $x < -a$

Back to the problem !!

$|x+3| > 7 \rightarrow$ set up 2 cases

$x+3 > 7$ or $x+3 < -7$

#8b) $f(x) = \frac{4}{x^2+2}$

$$f(-2) = \frac{4}{(-2)^2+2} = \frac{4}{4+2} = \frac{4}{6} = \frac{2}{3}$$

$$f(a+1) = \frac{4}{(a+1)^2+2} = \frac{4}{a^2+2a+1+2} = \frac{4}{a^2+2a+3}$$

7. True or false. If false, explain why by fixing the equality on the left or right.

a. $(x+3)^2 = x^2 + 9$ $F \quad (x+3)^2 = x^2 + 6x + 9$

b. $\frac{2}{y} - \frac{3}{x} = \frac{2-3x}{4}$ $F \quad \frac{2}{y} - \frac{3}{x} = \frac{2-3x}{4}$

c. $a^3 - 1 = (a+1)(a^2 - a + 1)$ F

or $\frac{a^3 + 1}{6-m} = (a+1)(a^2 - a + 1) = (a-1)(a^2 + a + 1)$

d. $\frac{6-m}{m-6} + \frac{2-n}{n-2} = -2$ T

$$-1 + -1 = -2$$

e. The domain of any polynomial is the set of all real numbers except zero. ($x \neq 0$)

$F \quad x \in \mathbb{R}$

zero is good
for polys!

f. The range of $f(x) = 3x + 4$ is $x \in \mathbb{R}$.



g. The set $\{(1, 3), (0, 2), (4, 3)\}$ of (x, y) represents a function from X to Y .

~~$x \mid y$~~
 $1 \mid 3$
 $0 \mid 2$
 $4 \mid 3$

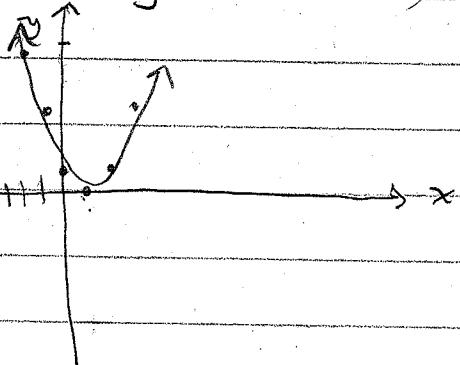
8.a. The domain of $f(x) = \frac{2}{x-1}$ is $x \neq 1$

b. The domain of $f(x) = x^3 - 3x^2 + 6x - 7$ is $x \in \mathbb{R}$

c. If a graph represents a function, then it will pass the vertical line test

9.a. Sketch the graph of $y = (x-1)^2$ after filling in the table of values. (Choose a representative set of x -values to send to y -values.)

x	y
-3	+16
-2	+9
-1	+4
0	+1
1/2	0
3	+4



b. Given $f(x) = \frac{4}{x^2+2}$ find:

$$f(-2) = \frac{4}{(-2)^2+2} = \frac{4}{4+2} = \frac{4}{6} = \boxed{\frac{2}{3}} \quad \text{You must reduce!}$$

$$f(a+1) = \frac{4}{(a+1)^2+2} = \frac{4}{a^2+2a+1+2} = \boxed{\frac{4}{a^2+2a+3}}$$

10.a. Evaluate $g\left(-\frac{1}{3}\right)$ for $g(x) = -x^2 - 5x + 1$

$$g\left(-\frac{1}{3}\right) = -\left(\frac{1}{3}\right)^2 - 5\left(\frac{1}{3}\right) + 1 = -\frac{1}{9} + \frac{5}{3} + 1 = \boxed{\frac{23}{9}}$$

b. Evaluate $\frac{f(a+h) - f(a)}{h}$ for $f(x) = 3x^2 - 2$

$$\frac{3(a+h)^2 - 2 - (3a^2 - 2)}{h} = \frac{3(a^2 + 2ah + h^2) - 2 - 3a^2 + 2}{h} = \boxed{6a + 3h}$$

$$\#10 \text{ a) } g(x) = -x^2 - 5x + 1$$

$$g\left(-\frac{1}{3}\right) = -\left(\frac{1}{3}\right)^2 - 5\left(-\frac{1}{3}\right) + 1$$

$$= -\frac{1}{9} + \frac{5}{3} + 1 = \frac{-1 + 15 + 9}{9}$$

(10)

$$\frac{23}{9}$$

b)

$$\frac{f(a+h) - f(a)}{h} \rightarrow f(x) = 3x^2 - 2$$

$$\cancel{f(a+h) - f(a)} = \frac{3(a+h)^2 - 2 - (3a^2 - 2)}{h}$$

$$= 3(a^2 + 2ah + h^2) - 2 - 3a^2 + 2$$

$$= 3a^2 + 6ah + 3h^2 - 2 - 3a^2 + 2$$

~~cancel h~~

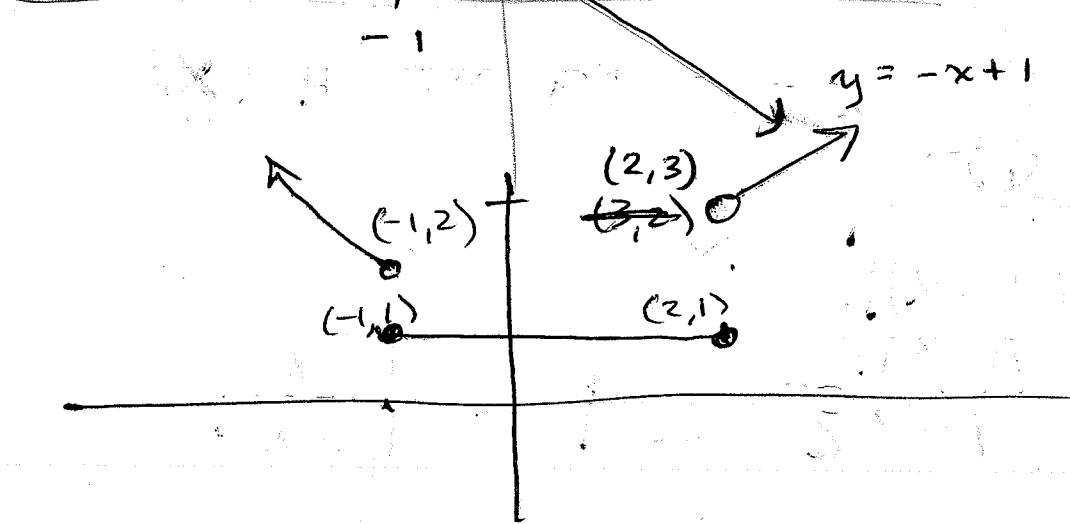
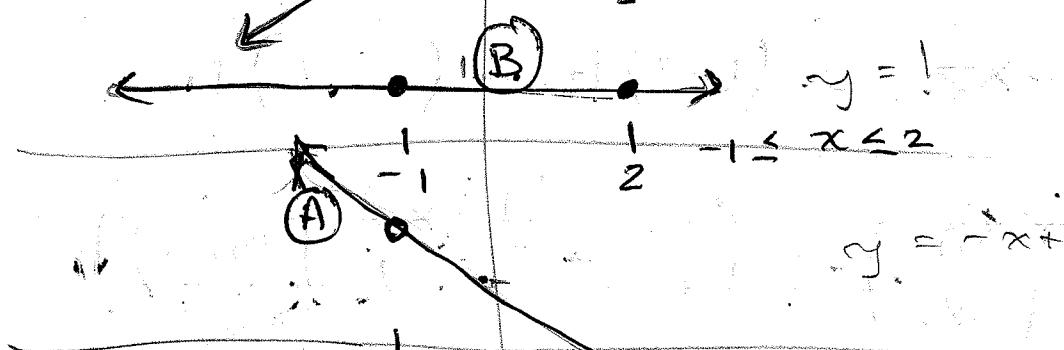
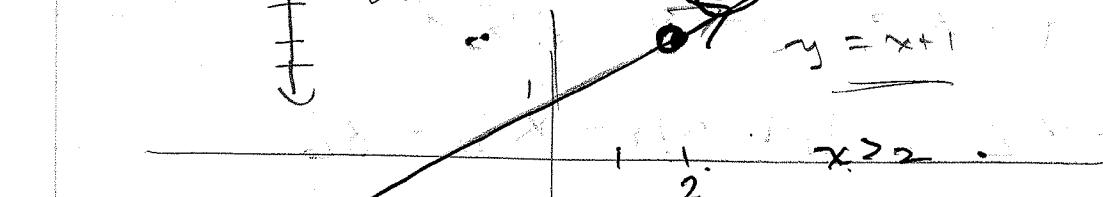
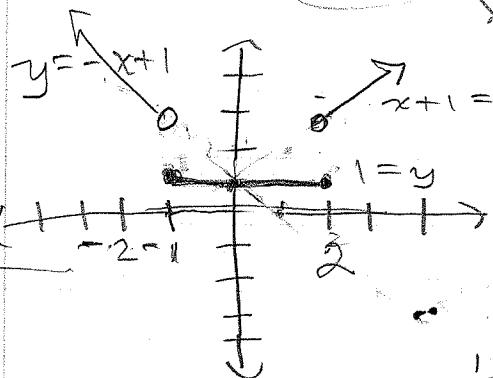
$$= 6ah + 3h^2$$

$$\boxed{6a + 3h}$$

Raymond then

$$\#16 \quad f(x) = \begin{cases} x+1, & x > 2 \\ -x+1, & -1 \leq x \leq 2 \\ x-1, & x < -1 \end{cases}$$

$$f(2) = 2+1=3$$



①

$$\begin{array}{r} x^2 - 3x + 9 + \frac{-54}{x+3} \\ x+3 | x^3 + 0x^2 + 0x - 27 \\ - (x^3 + 3x^2) \\ \hline - 3x^2 + 0x \\ - (-3x^2 - 9x) \\ \hline \end{array}$$

$$x^2 - 3x + 9 + \frac{-54}{x+3}$$

$$\begin{array}{r} 9x - 27 \\ - (9x + 27) \\ \hline - 54 \end{array}$$